



DEPARTMENT OF THE AIR FORCE  
AIR FORCE RESEARCH LABORATORY  
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11 October 2000

MEMORANDUM FOR USEPA

ATTN: ANNIE JARABEK  
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RTP, NC 27711

FROM: DEIRDRE MAHLE  
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SUBJECT: Consultative Letter, AFRL-HE-WP-CL-2000-0043, Hormone and  
Perchlorate Data from Cross-Fostering Study

1. Litters from timed pregnant Sprague-Dawley rats were cross-fostered at birth and sacrificed at PND 10. Group 1 dams were given either 1 mg/kg-day perchlorate in drinking water or control water beginning at GD 2. Three days later Group 2 dams were given 1 mg/kg/day perchlorate in drinking water or control water at GD 3. The litters from Group 1 were culled to 8 (4 males, 4 females) 1 day after delivery (PND 2) and remained with their dams until Group 2 litters delivered naturally. As Group 2 dams delivered (3 days later), each litter was removed from its Group 2 dam and placed with a Group 1 dam whose own litter had just been removed. Group 2 exposed litters were placed with Group 1 control dams, and Group 2 control litters were placed with Group 1 exposed dams. Three to four Group 2 exposed dams maintained their own exposed litters as the 'true exposed' group, and 3-4 Group 2 control dams maintained their own control litters as the 'true control' group. All litters were culled to 8 (4 male, 4 female) at PND 2. At PND 10 dam serum and thyroid and pup serum (pooled male and female), GI tract, GI content and skin were taken for later analysis. Serum was analyzed for TSH, T<sub>3</sub>, T<sub>4</sub> and perchlorate. All other tissues will be analyzed for perchlorate concentration.
2. The data for serum hormone levels in dam, female pups and male pups are in Table 1, 2 and 3, respectively. TSH in dam serum was significantly higher in both exposed dams with control litters and in true exposed dams than in control dams. Female pup serum from exposed dams had significantly higher levels of TSH than control female pups. T<sub>4</sub> in pooled female pup serum from exposed dams was significantly lower than control female pups. Tables 4 and 5 show the serum and thyroid levels of

perchlorate, respectively. Levels of perchlorate were non-detectable in serum or thyroid of true control dams and pups or exposed pups cross-fostered to control dams. Dam and pup serum levels of perchlorate in exposed dams with control litters and true exposed dams and litters were approximately the same. Perchlorate levels in control dam thyroid were non-detectable. Perchlorate levels in exposed dam thyroids were not significantly different. All other collected tissues will be analyzed for perchlorate concentration.

3. For further information, contact me at (937) 255-5150 ext. 3183, (937) 255-1474 (fax) or at [deirdre.mahle@wpafb.af.mil](mailto:deirdre.mahle@wpafb.af.mil).



DEIRDRE MAHLE  
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Attachments:  
Tables 1-5

1<sup>st</sup> Ind. AFRL/HEST

12 October, 2000

MEMORANDUM FOR USEPA  
ATTN: MS. ANNIE JARABEK

This letter report has been coordinated at the branch level and is approved for release.



DAVID R. MATTIE, Ph.D.  
Acting Chief  
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Table 1. Serum Thyroid Hormones for Maternal Rats at PND 10.

	True control	Control dams with exposed litters	Exposed dams with control litters	True exposed
TSH (ng/ml)	7.26 ± 0.55	7.23 ± 0.73	8.54 <sup>a</sup> ± 0.68	8.64 <sup>a</sup> ± 0.86
T <sub>4</sub> (µg/dl)	2.55 ± 0.23	2.64 ± 0.26	2.46 ± 0.25	2.32 ± 0.19
T <sub>3</sub> (ng/dl)	83.51 ± 7.23	83.5 ± 6.63	78.17 ± 7.51	79.67 ± 7.79

Data are mean ± s.d., n = 6-7.

<sup>a</sup>Significantly different from control, p<0.05

Table 2. Serum Thyroid Hormones from Pooled Female Pups at PND 10.

	True control pups	Exposed female pups with control dams	Control female pups with exposed dams	True exposed pups
TSH (ng/ml)	5.64 ± 0.33	6.29 ± 0.72	8.47 <sup>a</sup> ± 0.82	8.53 <sup>a</sup> ± 0.89
T <sub>4</sub> (µg/dl)	2.61 ± 0.21	2.54 ± 0.26	2.18 <sup>a</sup> ± 0.18	2.03 <sup>a</sup> ± 0.23
T <sub>3</sub> (ng/dl)	79.24 ± 5.07	84.1 ± 11.62	74.23 ± 8.68	76.90 ± 8.05

Data are mean ± s.d., n = 6-7

<sup>a</sup>Significantly different from control, p,0.05

Table 3. Serum Thyroid Hormones from Pooled Male Pups at PND 10.

	True control pups	Exposed male pups with control dams	Control male pups with exposed dams	True exposed pups
TSH (ng/ml)	5.55 ± 0.58	5.47 ± 0.59	6.32 ± 0.56	6.32 ± 0.64
T <sub>4</sub> (µg/dl)	2.55 ± 0.24	2.58 ± 0.28	2.47 ± 0.19	2.35 ± 0.26
T <sub>3</sub> (ng/dl)	80.34 ± 7.56	80.25 ± 7.01	76.91 ± 6.39	76.88 ± 6.13

Data are mean ± s.d., n = 6-7

Table 4. Perchlorate Concentration in Dam and Pup Serum at PND 10.

	True control	Control dams with exposed litters	Exposed dams with control litters	True exposed
Dam (ug/ml)	0.00 ± 0.00	0.00 ± 0.00	0.53 ± 0.07	0.41 ± 0.03
Male Pup (ug/ml)	0.00 ± 0.00	0.00 ± 0.00	0.54 ± 0.06	0.50 ± 0.05
Female Pup (ug/ml)	0.00 ± 0.00	0.00 ± 0.00	0.56 ± 0.07	0.54 ± 0.05

Data are mean ± s.d., n = 6-7

Table 5. Perchlorate Concentration in Dam Thyroid at PND 10.

	True control	Control dams with exposed litters	Exposed dams with control litters	True exposed
Dam (ug/g thyroid)	0.00 ± 0.00	0.00 ± 0.00	15.07 ± 1.7	13.94 ± 1.48

Data are mean ± s.d., n = 6-7